

## NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

### HEAVY USE AREA PROTECTION

(Square Feet)

CODE 561

#### DEFINITION

Heavy Use Area Protection is used to stabilize a ground surface that is frequently and intensively used by people, animals, or vehicles.

#### PURPOSE

Heavy Use Area Protection is used:

- To provide a stable, non-eroding surface for areas frequently used by animals, people or vehicles
- To protect or improve water quality

#### CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where a frequently or intensively used area requires treatment to address one or more resource concerns.

#### CRITERIA

General Criteria for All Purposes

**Design Load.** Base the design load on the type and frequency of traffic, (vehicular, animal, or human) anticipated on the heavy use area.

**Foundation.** Evaluate the site foundation to ensure that the presumptive bearing capacity of the soil meets the intended design load and frequency of use.

Where necessary, prepare the foundation by removal and disposal of materials that are not adequate to support the design loads.

Use a base course of gravel, crushed stone, other suitable material, geotextile, or a combination of materials on all sites that need increased load bearing strength, drainage, separation of material and soil reinforcement. Refer to Natural Resources Conservation Service (NRCS), National Engineering Handbook, Part 642; Design Note 24, Guide for Use of Geotextiles; or other State-approved reference for geotextile selection.

If there is the potential for ground water contamination from the heavy use area, select another site or provide an impervious barrier. Make provisions to treat contaminated surface runoff from the impervious area.

**Surface Treatment.** Select a surface treatment that is stable and appropriate to the purpose of the heavy use area. Surface treatments must meet the following requirements according to the material used.

Concrete. Design slabs-on-ground subject to distributed stationary loads, light vehicular traffic, or infrequent use by heavy trucks or agricultural equipment in accordance with American Concrete Institute (ACI) *Guide for the Design and Construction of Concrete Parking Lots (ACI 330R)*. Design slabs-on-ground subject to regular or frequent heavy truck or heavy agricultural equipment traffic in accordance with ACI *Guide to Design of Slabs-on-Ground (ACI 360R)*. Design liquid-tight slabs in accordance with ACI *Code Requirements for Environmental Concrete Structures, Slabs-on-Soil (ACI 350, Appendix H)*.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide](#).

NRCS-VT  
APRIL 2016

Design concrete structures in accordance with NRCS National Engineering Manual (NEM), Part 536, *Structural Engineering*.

**Bituminous Concrete Pavement.** Refer to AASHTO Guide for Design of Pavement Structures or the applicable State highway department's specification for design criteria for bituminous concrete paving.

In lieu of a site-specific design for areas that will be subject to light use, pave with a minimum of 4 inches of compacted bituminous concrete over a subgrade of at least 4 inches of well-compacted gravel. Use bituminous concrete mixtures commonly used for road paving in the area.

**Other Cementitious Materials.** Cementitious materials, such as soil cement, agricultural lime, roller-compacted concrete, and coal combustion by-products (flue gas desulfurization sludge and fly ash), can be used to provide a durable, stable surfacing material. Based on the properties of the surface material, develop a site-specific mix design with compressive strengths necessary for the expected use and loading on the heavy use area. Select materials that are non-toxic and that have chemical properties that are compatible with the intended use.

**Aggregate.** Design aggregate surfaces for expected wear and intended use. In lieu of a site-specific design for areas that will be subject to light non-vehicular use, install a minimum combined thickness for aggregate surfacing and base course of 12 inches for livestock and 4 inches for other applications.

For other applications, use Agricultural Engineering Note 4, *Earth and Aggregate Surfacing Design Guide*, or other appropriate methodology to design aggregate thickness.

**Mulches.** Use a minimum layer thickness of 6 inches for materials such as limestone screenings, cinders, tanbark, bark mulch, brick chips, or shredded rubber. Mulches are not recommended for livestock or vehicular applications.

**Vegetation.** Select vegetation that can withstand the intended use. Establish the vegetation in accordance with the criteria in NRCS CPS *Critical Area Planting (Code 342)* or the appropriate State reference.

**Other.** Other materials can be used if they will serve the intended purpose and design life.

**Structures.** When a roof is needed to address the resource concern, use NRCS CPS *Roofs and Covers (Code 367)*. For non-waste applications, design structures according to the accepted engineering practice.

**Drainage and Erosion Control.** Include provisions in the design for surface and subsurface drainage, as needed. Include provisions for disposal of runoff without causing erosion or water quality impairment. To the extent possible, prevent surface water from entering the heavy use area.

Stabilize all areas disturbed by construction as soon as possible after construction. Refer to the criteria in NRCS CPS *Critical Area Planting (Code 342)* for establishment of vegetation. If vegetation is not appropriate for the site, use the criteria in NRCS CPS *Mulching (Code 484)* to stabilize the disturbed area.

#### **Additional Criteria for Livestock Heavy Use Areas**

Include other practices to collect, store, utilize, or treat manure and contaminated runoff where contaminated runoff will cause a resource concern.

To minimize contamination to streams, barnyards and other livestock concentration areas shall be located outside the 25-year floodplain. Separation distances shall be such that prevailing winds and landscape elements such as buildings arrangement, landforms and vegetation minimize odor and protect aesthetic values. Springs, wells and other on-farm potable water source shall be located as far from the barnyard and other concentrated livestock areas as possible. Livestock heavy use areas shall not be installed closer than 200 feet to neighboring wells and potable water sources.

The recommended size of a paved livestock heavy use area shall not exceed 50 square feet per animal unit. This area allow room for bale feeders, feed bunks, watering facilities plus sufficient room for livestock to feed and exercise.

Curbing shall be installed:

- Aid in scraping and removal of manure from the barnyard.
- Divert clean runoff water away from the barnyard.
- Divert manure laden runoff to a waste storage facility.

Minimum curb height shall be 12 inches. Where the curb is used to aid scraping equipment to remove manure from the barnyard, minimum curb height shall be increased to 24 inches.

Fencing shall be installed to confine the livestock to the barnyard. Fencing shall be installed in accordance to practice standard 382 – Fence.

Where possible, roof runoff structures shall be installed to divert roof runoff away from the barnyard. Roof runoff practices shall be installed in accordance to practice standard 558 – Roof Runoff Structure.

Where it is economically practical, a roof may be installed over a barnyard to divert precipitation away. The roof and supporting structure shall be designed and installed in accordance to practice standard 367 – Roofs and Covers.

#### **Additional Criteria for Recreation Areas**

The Americans with Disabilities Act of 1990 (ADA) requires recreation areas that are used by the public to be accessible to people with disabilities. Address accessibility requirements for new construction and when existing facilities are being altered.

#### **CONSIDERATIONS**

Heavy use areas can have a significant impact on adjoining land uses. These impacts can be environmental, visual and cultural. Select a treatment that is compatible with adjoining areas. Consider such things as proximity to neighbors and the land use where the stabilization will take place.

Vegetated heavy use areas may need additional materials such as geogrids or other reinforcing techniques or planned periods of rest and recovery to ensure that vegetative stabilization will succeed.

Consider the safety of the users during the design. Avoid slippery surfaces, sharp corners, or surfaces and structures that might entrap users. For heavy use areas used by livestock avoid the use of sharp aggregates that might injure livestock.

Paving or otherwise reducing the permeability of the heavily used area can reduce infiltration and increase surface runoff. Depending on the size of the heavy use area, this can have an impact on the water budget of the surrounding area. Consider the effects to ground and surface water.

Installation of heavy use area protection on muddy sites can improve animal health. Mud transmits bacterial and fungal diseases and provides a breeding ground for flies. Hoof suction makes it difficult for cattle to move around in muddy areas. In addition, mud negates the insulation value of hair coat and the animals must use more energy to keep warm. As temperatures fall, animal bunching may occur, which can reduce or eliminate vegetative cover and lead to erosion and water quality concerns.

To reduce the negative water quality impact of heavy use areas, consider locating them as far as possible from waterbodies or water courses. In some cases, this may require relocating the heavily used area rather than just armoring an area that is already in use.

To the extent possible, maintain a 2 foot separation distance between the bottom of the surface material and the seasonal high water table or bedrock. [Water table may be lowered by using subsurface drainage. If necessary, blasting shall be approved by the State Conservation Engineer.](#)

To reduce the potential for air quality problems from particulate matter associated with a heavy use area, consider the use of NRCS CPS *Windbreak/Shelterbelt Establishment* (Code 380), *Herbaceous Wind Barriers* (Code 603), *Dust Control from Animal Activity on Open Lot Surfaces* (Code 375), or *Dust Control on Unpaved Roads and Surfaces* (Code 373) to control dust from heavy use areas.

Consider ways to reduce the size of the heavy use area as much as possible. This may require changes in how the livestock are

managed but in the long run may result in less maintenance and a more efficient operation.

For areas that will need to be cleaned frequently by scraping, loose aggregate or other non-cementitious materials may not be the best choice. Consider a more durable surface such as concrete.

### **PLANS AND SPECIFICATIONS**

Prepare plans and specifications for Heavy Use Area Protection that describe the requirements for installing the practice according to this standard. As a minimum the plans and specifications shall include:

1. A plan view showing the location and extent of the practice. Include the location and distances to adjacent features and known utilities.
2. Typical section(s) showing the type and required thickness of paving or stabilization materials.
3. A grading plan, as needed.
4. Where appropriate, plans for required structural details.
5. Method and materials used to stabilize areas disturbed by construction.
6. Construction specifications with site specific installation requirements.

### **OPERATION AND MAINTENANCE**

Prepare an operation and maintenance (O&M) plan and review with the operator prior to practice installation. The minimum requirements to be addressed in the O&M plan are:

1. Periodic inspections – annually and immediately following significant rainfall events.
2. Prompt repair or replacement of damaged components especially surfaces that are subjected to wear or erosion.
3. For livestock heavy use areas, include requirements for the regular removal and management of manure, as needed.
4. For vegetated heavy use areas, restrict use as needed to protect the stand and to allow vegetative recovery.

### **REFERENCES**

American Concrete Institute. 2006. Design of Slabs-on-Ground. ACI Standard 360R-06. Farmington Hills, MI.

Korcak, R. F. 1998. Agricultural Uses of Coal Combustion Byproducts. P. 103-119. *In* Wright, R. J., et al (eds.) *Agricultural Uses of Municipal, Animal and Industrial Byproducts*. USDA-ARS, Conservation Research Report 44.

USDA-Natural Resources Conservation Service. 2014. *Agricultural Engineering Note 4, Earth and Aggregate Surfacing Design Guide*, Washington, DC.